

MISCELLANEOUS NOTES

I.—ADAPTIVE COLOURATION OF DESERT ANIMALS

In a recent paper (Birds of Bahāwalpūr—Punjab) which was published in this *Journal* in December, 1941 (vol. xlii, No. 4, page 706) the author, Mr. Salim Ali, has written a section on desert colouration, which is rather misleading and leaves out the more recent work on adaptive colouration.

In the struggle for existence which is for ever going on in Nature, the primary needs of an animal are sustenance and security. To achieve these needs Nature has used many methods varying from the evolution of speed to the chemical warfare in which some insects are adepts. Of these colouration, adapted to the needs of the animal, is an important factor, whether it is used for concealment, warning or as a disguise.

In the desert the main type is concealing or 'effacing' colouration. It has long been a criticism that immobility is necessary for effective concealment, and as one of the properties of animal life is movement, how can any colouration be effective? There can be no doubt that immobility is a very important factor, as it is known that many animals react almost exclusively to visual *stimuli* in the form of movements by their prey, but it is equally certain that cryptic colouration is not valueless during movement. It is a principle which is made use of, in a reverse manner, at every cricket match to make the ball more visible to the batsman. If white side-screens were not provided the ball would tend to melt into the background and may even apparently disappear. With a white background, however, the red ball is perfectly clear for the whole distance after leaving the bowler's hand. There are numerous other practical applications especially at the present time in war-time camouflage. The modern camouflaged soldier is much less readily discernible than his scarlet uniformed predecessor, whether moving or not. Biologically it is best illustrated in the snow-lands where a small dog is visible when it is chasing the white arctic hare at distance from which it is impossible for the on-lookers to see the hare. Of course, at close range, the hare is visible; even its concealing colouration cannot hide it. But once the hare gets well ahead of the dog, the latter immediately loses sight of him, although the hare is still moving.

To summarize, it appears that the vision is attracted to any colour not in harmony with the background and by movement. To be perfectly concealed the animal must be immobile and harmoniously coloured in relation to its surroundings. But it is equally obvious that, whether at rest or in motion, an animal exhibiting concealing or cryptic colouration will obviously be more difficult to see than one out of harmony with its surroundings, and this is more obvious at a distance.

Consequently it is fair to conclude that far from only 'giving protection from chance predators' concealing colouration does give the animal a good deal of protection. What cannot be overstressed is that it does not give the animal complete protection, but quite obviously those with it have an advantage over those without it, and the latter are eliminated in the ruthless struggle for existence.

The associated subject of colour-perception in animals has unfortunately been insufficiently explored to make any generalisations as to the visual effect of protective desert colouration to animals other than Man. It can be said, however, that our range of vision shows us a really remarkable adaptiveness to the colour of their surroundings in several groups of animals. To animals with a less range of colour vision, the colours that they cannot perceive will be replaced equally in the colouration of the animal and of the background, by the next most intense colour component of the light, or if the colour is pure by black.

With regard to the origin of this colouration it is possible to speak with more authority. Although I have not seen the original paper by Col. R. Meinertzhagen's, from Mr. Salim Ali's paper I understand it to claim that the light pigmentation of desert animals is due to the large amount of ultra violet radiation which gets through. Neither this nor any other atmospheric condition, can account for the cases quoted below, more details of which can be found in Capt. H. B. Cott's book *Adaptive Colouration in Animals*. (London, 1940).

On an island in Dublin Bay, Ireland, there is a pale-coloured form of the house mouse found on the sandhills. The narrow stretch of water separating the island from the mainland has prevented any addition to the colony from the mainland, where the house mouse is of the normal dark colour, and it has now become colour-adapted to its new habitat.

An even more striking example is found in the Tularosa Basin, New Mexico. Here dark forms of rodents can be found living on the black larval beds, which are a feature of that locality, but in the surrounding desert the rodents are light-coloured, and of the typical desert colouration.

In neither of these cases is it a case of atmospheric conditions, as both are living under practically the same conditions and yet are differently coloured. It can only be explained as a direct result of natural selection eliminating the colour variants unsuitable to their surroundings, and thus gradually establishing a new colour race adapted to its environment.

Further any theory of animal colouration should embrace the whole of the subject, and no atmospheric conditions can account for the remarkable behaviour of the arctic animals, whereas it is clearly understood if one considers the needs of the animal for security and to enable it to obtain its food. Why, for instance, should the reindeer remain brown all the year? Why should the hare change from brown in summer to white in winter? Atmospheric conditions are the same for both, and are the same for the polar bear which remains white! The reindeer and hare both

have a vegetable diet, so the change must be connected with the security of these animals. And it is so, the reindeer has no enemies, whereas the unfortunate hare has many, and only survives with the aid of his concealing colouration. In the case of the polar bear, the struggle for existence relaxes in summer. Food is plentiful, but in winter there is famine, and then the cryptic white colouration assists it immeasurably.

To conclude I must acknowledge my enormous debt to Capt. H. B. Cott, who first interested me in this subject, and who, if he were available, is infinitely more competent to deal with this subject. As far as possible I have followed his new terminology, but as his book is not available at present, I have been somewhat handicapped in this respect. Further, I cannot do any better than to refer anyone for a complete account of adaptive colouration of animals to this work.

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II.—THE WOLF (*CANIS LUPUS* LINN.) IN BALUCHISTAN.

In July 1941 I came across two wolves at about 11 o'clock one morning near Anjinai (Kakari Khorasan). I was riding along a path when they suddenly appeared at a canter, crossed the path 100 yards ahead and disappeared into some hills. I followed on foot but never saw them again. These wolves were about the size of Alsations though of leaner and longer proportions. They were of usual grey colour and markings as far as I could see.

A snowfall occurred in December: three days later two wolf skins were brought in to Quetta for the usual rewards. One was of the normal grey colour and measured about 4 ft. 6 ins. length: the other was a magnificent creamy white one with a faint orange tinge down the centre of the back and a few black flecks in the sides and tail. This skin which I have had cured measures 5 ft. 10 ins. in length.

The wolf was one of three which chased an inhabitant of Jalogir, a village situated 19 miles from Quetta on the Chaman road, into his house; the man told me that he only just banged his door in time as the wolves were close on his heels. He then seized a spade, cautiously opened the door and was confronted by the white wolf which he knocked on the head with his spade, whereupon the other two made off.

A heavy fall of snow occurred in January. A few days later I was informed that three men had been killed and eaten and one bazaar sweeper badly mauled during the night by a pack of wolves close to Hindubagh in the Zhob valley. I have had no confirmation of this report.